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PROCEEDINGS
OF
THE ROYAL SOCIETY.

1838.

No. 35.

November 15, 1838.

DAVIES GILBERT, Esq., V.P., in the Chair.

The following gentlemen were, by ballot, elected Auditors of the Treasurer's accounts, on the part of the Society, viz., Thomas Gal-
loway, Esq., Thomas Graham, Esq., Sir John F. W. Herschel, Bart.,
M.A., John W. Lubbock, Esq., M.A., and the Rev. Adam Sedg-
wick, M.A.

Monck Mason, Esq., was balloted for, but not elected into the
Society.

A paper was read, entitled, "Discovery of the Source of the
Oxus." By Lieut. Wood, of the Indian Navy. Communicated by
James Burnes, K.H., D.C.L., F.R.S., in a letter to the Secretary
of the Royal Society.

The following notice of the discovery of the source of the Oxus
by Lieut. Wood, one of the officers serving under Captain Alex-
ander Burnes, F.R.S., in his political and scientific mission to Cabul,
is contained in a letter from Captain Burnes :

"This celebrated river " (the Oxus) " rises in the elevated region
of Pameer in Sinkoal. It issues from a sheet of water, encircled on
all sides, except the west, by hills, through which the infant river
runs ; commencing its course at the great elevation of about 15,600
feet above the level of the sea, or within a few feet of the height of
Mont Blanc. To this sheet of water Lieut. Wood proposes to as-
sign the name of *Lake Victoria*, in honour of Her Majesty."

November 22, 1838.

FRANCIS BAILY, Esq., V.P. and Treas., in the Chair.

Lieut.-General John Briggs, E.I.C.S., was balloted for, and duly
elected into the Society.

A paper was read, entitled, " On the State of the Interior of the
Earth." By W. Hopkins, Esq., M.A., F.R.S., F.R.A.S., &c.

The object of the present memoir is to inquire into the modes in
which the refrigeration of the earth may have taken place, on the

hypothesis that its entire mass was originally in a fluid state; an hypothesis which was at first founded on astronomical considerations, and is now corroborated by the discoveries of modern geology, exhibiting the apparent injection from below of large masses of unstratified rocks, through the fissures of sedimentary strata. Assuming that this state of fluidity was the effect of heat, we are led to consider the steps of transition by which the earth has passed into its present state of solidity, and apparently permanent temperature. After adverting to the analytical investigations of Fourier and Poisson on this subject, the author proceeds to inquire into the results of the laws of refrigeration of heated bodies, which may be conceived to operate in the present case; namely, refrigeration by *circulation*, which obtains when the fluidity is perfect, and that by *conduction*, when the particles of the mass, by the diminution of fluidity, no longer retain that mobility among one another which is requisite for their circulation. Thus while, in either case, the superficial parts of the earth would rapidly cool and solidify by the radiation of their heat into sidereal space, forming a crust of small thickness compared with the whole radius of the globe, the internal mass may be in one or other of the three following conditions:—*First*, it may consist of matter still in a state of fusion, of which both the temperature and the fluidity are greatest at the centre, but which has been brought, by the long-continued process of circulation, into a state no longer admitting of this process, and capable, therefore, of cooling only by conduction. *Secondly*, the earth may consist of an external shell, of a central nucleus, rendered solid by the enormous pressure to which it is subjected, and of an intermediate stratum of matter in a state of fusion. The thickness of the shell, as well as the radius of the solid nucleus, may possibly be small compared with the radius of the earth. The fluidity of the intervening mass must necessarily be here, also, considerably more imperfect than that which would just admit of cooling by circulation. *Thirdly*, the earth may be solid from the surface to the centre.

The author then shows that the direct investigation of the manner in which the earth has been cooled, assuming its original fluidity from heat, cannot determine the actual condition of its central parts, not from any imperfection in the analytical process, but from the want of the experimental determination of certain values, which it is extremely difficult, if not impossible, accurately to obtain. It has occurred to the author that a more indirect test of the truth of the hypothesis of the central fluidity of the earth might be found in the delicate but well-defined phenomena of precession and nutation. The investigation of the problems thus suggested is reserved by the author for the subject of a future memoir.

November 30, 1838.

Francis Baily, Esq., V.P. and Treasurer, in the Chair.

At the Anniversary Meeting of the Royal Society, Mr. Galloway,